ABSTRACT

The present invention relates to all-optical OR and XOR logic elements employing saturable absorbers as optical gates. Saturable absorbers are arranged in paths of the Mach-Zehnder interferometer, respectively. If the total power of an input optical signal and a continuous wave signal is higher than a transparent input power of the saturable absorbers, the input optical signal passes through the saturable absorbers, and then the optical signals through the two paths are combined, so that it is possible to obtain the operational characteristics of the OR and XOR logic elements.

According to the present invention, unlike the optical logic element using a cross-phase modulation by a semiconductor optical amplifier, phase difference depending upon the input optical power is not generated between two paths, so that it is possible to alleviate a restriction of an allowable range of the input optical power.